whole load suddenly be taken off. The speed would then rise, causing the steam supply to be reduced by the governor, but the speed of the engine would be still accelerated by the expansion of the steam left in the cylinder and passages. In the case of a triple-expansion engine the amount of steam left in the ports and passages is usually greater than in a compound engine of the same speed and power. Of course the momentary rise in speed caused by a sudden decrease at lower loads is proportionately less, with a given engine, because the pressure of the steam in the cylinder and passages of the engine is lower, and therefore can do less work in acceleration.

For these reasons the proportions of fly-wheels are greatly empirical. For compound engines the stored energy in- foot tons is from 0*3 to 0-5 per brake horse-power and for triple engines it is from 0*45 to 0-75. In each case it may be less if the machinery immediately driven by the engine has a rotor containing a considerable amount of stored energy.

Fly-wheels for high-speed engines are of a very simple type. They are invariably a plain casting consisting of a heavy rim connected to the boss by a web. For heavy wheels the boss is sometimes made separate, and is keyed on to the shaft, the wheel being mounted upon the boss. This construction is likely to minimize casting strains in the web, the central hole allowing it to contract in cooling much more easily. It is also of some advantage in transport, as the wheel can be dispatched separately from the shaft. There is a flange on the boss against which the machined face of the web abuts, the whole, with the bolts, forming a coupling for connection to the coupling on the driven shaft or the armature of the electrical generator.

The peripheral speed of the rim should not exceed 100 ft. per second. In small engines it is often not more than 80 ft. per second.

The coupling bolts are usually in single shear, and their diameter should be such as to keep the shearing stress about 6000 Ib. per square inch. If R is the radius in feet to the centre line of the bolts, then the shearing force

acting at R = BHP X ——- X 1-8 for compound engines and by 1-4 tor

triples.    N is the number of revolutions per minute.

The coupling boss on the shaft has a diameter of twice that           ot           the           shaft, and the thickness of flange may be equal to $i\%d + $ J for small           bolts           and $i|d + $ i for large bolts where $d = $ diameter of bolt. The bolt           holes           should be left for reamering, and the bolts made a light driving fit.